

Remarks

Claim 1 has been amended to remove the term “in the absence of ozone” which was considered to constitute new matter by the Examiner. This claim has also been amended to (a) require that the composition “consist essentially of” rather than “comprise” the listed components; and to specify that such composition may optionally include a catalyst. Support for this amendment is found in original claim 15 – consequently, no new matter has been added as a result of this amendment.

Pursuant to the Office Action mailed April 3, 2009, the amendment filed March 6, 2009 was objected to under 35 USC 132 (a) and the pending claims rejected under 35 USC 112, first paragraph due to the presence of the phrase “in the absence of ozone”. In addition, pursuant to such Office Action claims 1-4 and 9-16 stand finally rejected as being anticipated by Bradley (US Patent 5,849,201); while claims 5-8 stand finally rejected under 35 USC 103(a) as being obvious over Bradley. Claim 17 stands finally rejected under 35 USC 103(a) as being unpatentable over Bradley in view of Lundy (US Patent Application publication 2002/0110509). These rejections are respectfully traversed, and reconsideration requested in light of the arguments presented below.

Preliminarily, applicants note that claim 1 has been amended to delete the term “in the absence of ozone”. Consequently, it is respectfully submitted that the objection and the rejection of the claims pursuant to 35 USC 112, first paragraph should be withdrawn.

The present invention, as amended, relates to a process for oxidizing organic compounds, typically present as environmental contaminants, comprising treating such organic compounds with a composition consisting essentially of a persulfate, a pH modifier which maintains the pH of the composition at about 10 or higher, and optionally a catalyst. As is indicated by the Examples, this process is unexpectedly effective to oxidize a large number of organic contaminants, including several (such as benzene, toluene, ethyl benzene, xylene and chlorinated benzenes) which contain aromatic hydrocarbon rings.

In contrast, Bradley (U.S. Patent 5,849,201) discloses a process for remediating aromatic hydrocarbons which involves treatment with ozone in conjunction with a solid state catalyst, a first oxidant other than ozone, and a surfactant (see Column 4, lines 15-25). Applicants respectfully urge that Bradley does not anticipate or suggest the present claimed invention for the following reasons:

1. Bradley does not exemplify the use of a composition consisting essentially of a persulfate; a pH modifier; and (optionally) a catalyst.

A review of the examples of the Bradley publication reveals that the only true working example, Example 1, employs hydrogen peroxide in conjunction with an iron/nano-titania catalyst. Neither a persulfate nor a pH modifier are employed. The remaining Examples are all written in the present tense, indicating that they were never actually run. Further, none of these paper examples describes the use of a persulfate. Example 2 is the only Example which refers to the use of a pH modifier, which is a base used to increase the pH to a value of 7 or greater (see Column 16, lines 29-30). This is considerably below the pH required in the present claimed invention.

2. Bradley discloses that persulfates are ineffective to decompose aromatic contaminants and therefore teaches away from the present claimed invention.

At column 2, lines 5-9, Bradley declares that “Solid-state oxidants, for example persulfate, are similarly **ineffective** with respect to [the degrading of] PAHs. Solid-state oxidants tend to be less powerful oxidants relative to what is required to cleave and oxidize aromatic ring systems...” (emphasis added).

Thus the clear teaching of Bradley is that persulfates are ineffective to oxidize aromatic contaminants. In this regard, the Examiner's attention is directed to Table 4 (on page 15 of the present specification) wherein it is shown that the use of persulfate and a high pH modifier is effective to decompose benzene, toluene, xylene and other aromatic hydrocarbons. Applicants submit that these results are completely unexpected in view of Bradley's assertion that persulfate is ineffective to cleave and oxidize aromatic ring compounds.

3. Bradley discloses that the use of ozone is essential.

At column 2, lines 21-25 Bradley declares that “**Ozone is unique** among the stable, industrial usable, safe and environmentally acceptable oxidizing agents in that ozone has a half-life on the order of minutes and can cleave and oxidize benzene and other aromatic ring structures including PAHs” (emphasis added). This statement would suggest to one of ordinary skill in the art that any that any process which did not include ozone would be ineffective to oxidize benzene and other aromatic rings. Again, the Examiner’s attention is directed to the results presented in Table 4 of the present specification, which demonstrate the oxidation of aromatic compounds without the use of such “unique” antioxidant.

4. Bradley provides no motivation to add a pH modifier if ozone is not present.

At Column 5, lines 29-33 Bradley states that “A base, such as sodium hydroxide, may be optionally added to the mixture. This optional addition of base is desirable if the mixture is acidic since ozone treatment is more effective under slightly basic conditions.” Thus, the clear teaching of Bradley is that the only reason to add base – if one is going to add a base at all – is to enhance the activity of ozone. Consequently, one would assume from a reading of this publication that the addition of a base would serve no useful purpose with regard to the oxidation of aromatic contaminants in an oxidizing composition consisting essentially of persulfate with such PH modifier and (optionally) a catalyst. Once again, Applicants respectfully point out that the data presented in Table 4 of the present specification indicates that the activity of persulfate is unexpectedly enhanced by the addition of such a pH modifier.

In light of the above, it is respectfully submitted that Bradley neither suggests nor discloses the invention as claimed in claims 1-16.

Lundy (US Patent Application 2002/0110509) discloses the use of a chelated catalyst in combination with a peroxide oxidizing agent. Lundy states (at page 5, paragraph 29) that the peroxides which may be employed include hydrogen peroxide, magnesium peroxide, calcium peroxide and sodium percarbonate. There is no suggestion or disclosure that such chelated catalysts may be effectively employed in conjunction with a persulfate. Accordingly, it is

respectfully urged that Lundy, even if read in conjunction with Bradley, does not suggest the claim 17.

Overall, therefore, it is respectfully submitted that the present claimed invention, as amended, is neither anticipated nor suggested by the cited publications. Reconsideration of the rejection of such claims is respectfully requested and allowance thereof courteously solicited.

Respectfully submitted,

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